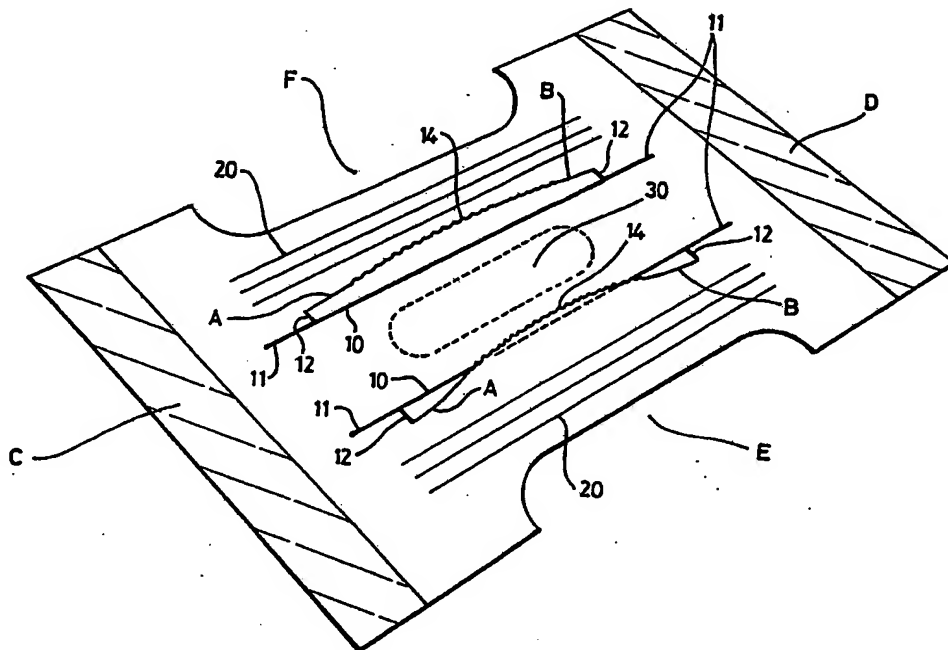




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(54) Title: DIAPER (57) Abstract <p>The present invention relates to a disposable sanitary article, for example a diaper, having an absorbent layer (2) provided with one or more additive materials (4) adapted to enhance the fluid absorption properties of the layer, characterised in that the amount of such additive(s) in a first portion of the pad which is adapted to be in the immediate neighbourhood of the source of the fluid to be absorbed by the pad during use is reduced as compared to the portions of the pad in outward flow relation to that said first portion, preferably this is achieved by cutting away the appropriate portions (30) of a sheet (6) intermediate the next-to-the-skin layer of the article and the underlying absorbent layer, which intermediate sheet carries part or all of the absorbent additive material.</p>		



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TITLE: DIAPER

The present invention relates to diapers, notably to a disposable diaper having areas in which fluid can flow more
5 freely into the absorbent pad area.

BACKGROUND TO THE INVENTION:

Disposable diapers are typically made from a composite
10 fabric which comprises a fluid permeable next-to-the-skin sheet or layer and a fluid impervious outer sheet or layer with an intermediate fluid absorbent layer. The next-to-the-skin, or inner, layer is typically made from a hydrophillic woven or non-woven sheet material. For
15 example, it can be made from a bonded polyester, polypropylene or other resin fibre or sheet or a cellulosic tissue or other fluid permeable sheet and functions to allow the bodily fluids to pass through the sheet to be absorbed by the intermediate absorbent layer. Various modifications
20 of such an inner sheet or layer have been proposed. These include treatment of part of the sheet or layer to form hydrophobic lateral portions. It has also been proposed to render the layer resistant to back flow of fluid so that, once the fluid has passed through the layer, the treatment
25 reduces re-wetting of the skin of a wearer.

The outer layer is typically a water impervious sheet, for example of a polyethylene or other polymer and serves to retain fluid within the diaper. Again modifications to such
30 a layer have been proposed, for example to perforate the sheet or otherwise permit the passage of vapour but not fluid so that at least part of the fluid carried by the absorbent layer can be lost by evaporation through the outer layer without the outer face of the outer layer becoming
35 damp to the touch.

The intermediate layer is typically formed from a pad of dry formed cellulosic or other fibres, which may be solid or hollow, and which serves to absorb fluid passing through the inner layer. Such a pad can be formed by fluffing up a layer of cellulosic fibres mechanically; by bonding together short lengths of fibres by heat, pressure or other bonding methods; or by forming a tangled mass of a long fibre, which may carry one or more heat, pressure or other forms of adhesive so that the fibre pad forms a coherent body. The pad can be contained within an envelope of a tissue or other sheet material to retain the fibres as a pad of the desired shape and such an envelope can be heat bonded or otherwise adhered to the surface layers of the fibres in the pad.

Typically, such a diaper is formed from its component parts as a length of a composite fabric from which the desired shape of individual diaper is cut by stamping, water jet or air blade cutters. If desired, the various layers making up the composite diaper fabric can be bonded together, for example using a pressure or thermal adhesive or a UV settable adhesive applied as a series of strips or as an overall coating to the relevant faces of the layers during the bringing together of the layer materials. The cutting away of the parts of the diaper to give the desired anatomically shaped, ie. waisted shape, diaper can be done as each layer is introduced during the construction of the diaper and such cutting can also cause thermal bonding of the cut edges, as when a cutter/sealed bar is used to cut layers made from or adhered together by a thermoplastic resin.

Typically such diapers have a T or H plan shape with the upright of the T or the cross bar of the H passing between the legs of a wearer to lie adjacent the crotch area of the body of the wearer. This area of the diaper is typically formed with a waisted plan shape to assist the diaper to

conform to the anatomical shape of the body of the wearer. The cross piece of the T or the uprights of the H are then passed around the waist of the wearer and the overlapping free ends thereof secured together, preferably by a self adhesive pad or the like attached to the free ends, to form a waistband around the body of the wearer and thus secure the diaper in position upon the body of the wearer. To assist a close fit of the diaper and to accommodate variations in the size of the wearer's body, it has been proposed to incorporate elastication into the waistband of the diaper and along at least along the anal region of the diaper. Such elastication can be introduced by inserting tensioned elastic threads or tapes between the layers of the diaper fabric at the desired position during manufacture of the diaper or by accordion folding the area to be elasticated and inserting or adhering an elastic thread in a relaxed state to achieve a shirred effect. Alternatively, a thermally elasticated thread, tape or strip can be applied in its elongated state to one face of the diaper or inserted between layers during manufacture of the composite fabric. Upon heating, such a material will revert to its shorter elastic state and achieve a similar shirred effect.

In order to enhance the fit of such a diaper upon the body of a wearer, it has been proposed to incorporate one or more upstanding cuffs along each side of the crotch area of the diaper. Such cuffs act to restrain the escape of fluid and faeces from the diaper either by acting as a dam or by acting as a filter so that undesirable leakage of bodily fluids and/or solids is reduced as the diaper is flexed by the body movements of a wearer. Typically, such cuffs are provided as extra strips of material at or adjacent the longitudinal edges of the crotch area of the diaper and are caused to be upstanding by carrying longitudinal tensioned elastication along their free longitudinal edges. Such

elastication can be introduced by inserting a tensioned elastic thread into a pocket formed along the edge of the strip, by adhering such a tensioned thread at or adjacent the edge or by applying a heat elasticisable thread tape or
5 strip along the edge.

The number and location of the elasticated areas along the edges of the leg cuff, along the edges of the crotch areas and waistbands of the diaper can vary. For example, it will
10 be usual to use three or more parallel rows of elastic threads along or inset from each of the edges of the diaper in the crotch area. The leg cuffs can be secured laterally inside or outside some or all of these rows of thread and the thread or threads along the laterally inward edge of the
15 leg cuff strips can be located at the edge of the strip or inset some distance therefrom to give a ruffled type of edge to the cuff.

For convenience, the term disposable diaper will be used
20 herein to denote in general the above basic type of diaper and its various modifications.

In order to enhance the fluid absorption of the absorbent layer in the diaper, it has been proposed to incorporate one
25 or more particulate materials into the absorbent layer which have the property of absorbing many times their own weight of fluid. Such super absorbers include, for example, cross-linked acrylate polymers.

30 We have found that the presence of the super absorber retains the fluid in the location at which it is applied to the absorbent pad and reduces the free dispersal of the fluid throughout the absorbent pad. As a result, the pad becomes locally supersaturated with urine or other fluid at
35 the point where maximum absorption of fluid is required to

be maintained. Surprisingly, we have found that if the super absorber is located adjacent to the area of maximum discharge of fluid onto the pad rather than within that area, it removes the fluid from the discharge area and
5 retains the absorptive capacity of that area. In this way the diaper can continue to absorb fluid without the wearer suffering excessive skin re-wetting and subsequent discomfort and skin rashes or sores due to supersaturation of the pad in this area.

10

SUMMARY OF THE INVENTION:

Accordingly, the present invention relates to a disposable diaper or other sanitary article having an absorbent layer
15 provided with one or more additive materials adapted to enhance the fluid absorption of the layer, characterised in that the amount of such additive(s) in a first portion of the pad which is adapted to be in the immediate neighbourhood of the source of the fluid to be absorbed by
20 the pad during use is reduced as compared to the portions of the pad in outward flow relation to that said first portion.

Preferably, the diaper is provided with means which assist flow of fluid onto said first portion, notably by means of
25 areas of the diaper which are rendered hydrophillic and/or in which part or all of the absorbent additive carrying material have been removed.

The absorbent layer for present use can be manufactured from
30 a wide range of materials using any appropriate technique. Thus, the absorbent layer can be in the form of a loose bed of fibres, as is formed by passing a sheet of cellulosic pulp board through a hammer mill or the like; a mass of short strand length fibres which are bonded together by
35 applying an adhesive coating to the fibres and/or by

applying heat and/or pressure to cause the fibres to adhere to one another; or the fibres can be admixed with particles of a thermoplastic material which causes localised bonding between the fibres under heat and/or pressure.

- 5 Alternatively, the absorbent layer can be formed by the agitation or swirling of long fibres to form a complex tangled mass which is sufficiently coherent to form a handle-able pad of fibres. In a further alternative, the absorbent layer may be formed from a foamed polymer sheet.
- 10 Where the absorbent layer is formed from a loose mass of fibres, it may be necessary to envelope the pad in a tissue paper or the like covering. For convenience, the invention will be described hereinafter in terms of a conventional loose fibre pad having an outer wrapping of a tissue paper.

15

- The fibres can be formed from natural or synthetic fibrous materials, for example cotton or wood fibres; fibres made from cellulose or a cellulose derivatives, eg. carboxymethyl cellulose or rayon; polyamide; polyester, eg. poly(ethylene
- 20 terephthalate); polyalkylene, eg. polyethylene, polypropylene; vinylic polymers, eg. polyvinyl chloride, polyvinyl acetate or polyvinylidene chloride; or any other suitable material used to form fibrous materials. Mixtures of different fibres, or fibres which comprise a coating or
- 25 sheath of one polymer upon a core or filament of another may be used if desired and the fibres may be solid or hollow.

- It is particularly preferred that the fibres and/or the material bonding them together be formed at least in part
- 30 from a material which readily dissolves or disintegrates when exposed to alkali, preferably to an aqueous alkali solution having a pH value above 7.5, typically above 8.5, so that the absorbent layer will disintegrate when exposed to such a solution in a toilet pan and can then be disposed
- 35 of by flushing the toilet. Thus, the fibres and/or bonding

agent can be formed from a homopolymer and/or co-polymer of acrylic acid, an alkylacrylic acid and esters thereof, notably C₁ - C₅ alkyl esters of acrylic or methacrylic acids, for example the methyl, ethyl or butyl esters, or acrylonitrile; homo- and co-polymers of carboxy ester lactones, styrene-monoethyl maleate or N,N'-diethylacrylamide; polymers of other types which have been chemically modified by the introduction of solubilising groups such as carboxylic acid, sulphonic acid, sulphite, sulphate, phenolic hydroxy, ester or diamide groups; or polymers which have been rendered soluble by the introduction of interpolymer units into the main polymer chain, for example the silane interpolymers of US Patents Nos 4 062 451 and 3 951 893. Particularly preferred alkali sensitive polymers for present use are the substantially linear co-polymers of from 2 to 6 parts by weight of one or more monomers selected from acrylic acid, ethyl acrylate, butyl acrylate or acrylonitrile with one part by weight of methacrylic acid monomer to give thermoplastic resin products having molecular weights of from 25,000 to 300,000. Particularly preferred acrylic resins for present use are those thermoplastic resins which are substantially free from cross-linking, ie. are substantially linear polymers, and which have a carboxyl functionality of from 3 to 15 weight percent and an acid number in the range 30 to 250, notably 60 to 120. If necessary, the resulting resin can be treated in known manner with an alkali or base, for example ammonia, sodium hydroxide, morpholine or an alkylamine (for example triethylamine or triethanol-amine), to impart the desired water solubility under alkaline conditions. If desired, the fibres can comprise a core of a water soluble or disintegrable resin to which has been applied an alkali sensitive protective sheath. Suitable water soluble resins include, for example, a polymer or copolymer of vinyl alcohol, a poly(alkylene oxide) or polyvinylpyrrolidone.

Particularly preferred water soluble polymers are vinyl alcohol polymers or co-polymers having a saponification value of from 80 to 90%.

- 5 Part, for example up to 20% by weight, of the fibres may be provided by fibres made from a super absorbent material, for example a polyacrylic resin, admixed with the cellulosic or other fibres so as to enhance the absorbent properties of the absorbent layer. Alternatively, the super absorbent can
10 be provided as one or more layers of particulate material formed within the absorbent layer and/or one or more layers of particulate material or fibres adhered to the upper face of the absorbent layer. In a further alternative, at least part of the super absorbent material is provided as a
15 coating or layer on a portion of the next-to-the-skin layer of the diaper composite fabric, for example as a layer of granules of the super absorber bonded to a non-woven fluid pervious sheet intermediate the absorbent layer and the exposed sheet which forms the next-to-the-skin face of the
20 diaper. For convenience, the invention will be described hereinafter in terms of a diaper absorbent layer having a sheet of material carrying particles of the super absorbent material as an interface between the sheet and the top face of the pad of fibres forming the absorbent pad of the
25 diaper.

Many forms of super absorbent materials are available commercially. Super absorbers typically comprise a material having a backbone of a natural or synthetic resin carrying
30 hydrophillic groups or having polymers containing hydrophillic groups bonded thereto, or such a material in intimate admixture with such polymers. Suitable super absorber materials include modified and regenerated polymers such as polysaccharides, notably starch graft polymers,
35 cross linked glycollate and cellulose ether polymers and

polyacrylates, notably cross-linked acrylic acid polymers. Such polymers are described for example in US Patent 4,105,033.

- 5 It is preferred to incorporate the super absorber into the fibrous layer as particles having an average particle size in the range 100 to 1000 micrometres and to incorporate those particles by admixing them with the fibrous material before or as the layer is formed so that the particles are
- 10 substantially uniformly distributed throughout the layer. In some cases, the super absorber may also act as the thermoplastic bonding agent described above. However, it is within the scope of the present invention for the super absorber to be applied as a dispersion or emulsion of the
- 15 material in water or other suitable carrier medium so as to form a coating on the staple fibres which is dried in situ within the fibrous layer after it has been formed. The super absorber is typically present in from 5 to 20% by dry weight of the fibrous material in the absorbent layer so as
- 20 to provide from 0.5 to 40, preferably from 2 to 20, gs of super absorber per pad or diaper formed from the absorbent layer and its overlying sheet carrying the super absorber.

- In such methods as practised hitherto, the super absorber
- 25 will be distributed substantially uniformly throughout the absorbent layer or over the surface of the sheet to which it has been applied. In the present invention this is to be avoided, since it is desired to provide areas where the level of super absorbent is reduced or non-existent. This
- 30 can be achieved by modifying the application techniques hitherto used so that the super absorbent is not applied to the given area, for example by interrupting the flow of particulate material as the desired area of the fibrous layer passes under the super absorber applicator when the
- 35 super absorber is applied as a layer within the absorbent

layer.

However, it is particularly preferred that at least part of the super absorber is applied as a layer or coating on a sheet of material, which may be the same or different to the exposed sheet of the next-to-the-skin layer and to provide this sheet as an interface between the exposed next-to-the-skin sheet and the absorbent layer, notably as a second sheet within the next-to-the-skin layer.

10

A particularly preferred method for achieving the desired lower level of the super absorber is mechanically to cut away the sheet carrying the super absorber in the desired area. This is conveniently achieved by cutting out an aperture of the desired size and shape from the sheet of material using a rotary knife blade, high pressure air or water jet or other means as the sheet is fed to the diaper composite fabric manufacturing line. The sheet may have already had the desired super absorbent applied thereto, or the super absorber can be applied after the desired aperture(s) have been cut. In this way it is possible to form localised areas with no super absorber according to the gender of the intended wearer of the diaper, for example at the mid-crutch area and forward thereof for a male and at the mid-crutch area for a female.

Where a sheet carrying super absorbent material is used, it is preferred that this sheet be an interface between the absorbent layer and the next-to-the-skin sheet of material, for example by being a cover sheet for the absorbent layer to which it may be bonded, or as a separate sheet interposed between the absorbent layer and the next-to-the-skin layer, or preferably by being bonded to the underside of the exposed sheet of the next-to-the-skin layer so as to form part of the next-to-the-skin layer. This ensures that,

where any apertures are cut in the super absorber sheet, particles of the super absorber or the fibres from the underlying pad do not come into direct contact with the skin of the wearer.

5

We have found that the use of an apertured super absorber sheet also provides the advantage that the flow of urine or other fluid into the underlying absorbent layer is facilitated through the aperture(s) and that this flow then
10 disperses laterally within the absorbent layer due to the action of the super absorber adjacent the aperture. In this way the user's skin is not exposed to the supersaturated absorbent layer as with previous proposals where the super absorbent material is uniformly present or is present in
15 localised concentrations in the urethral position of the diaper. The free flow of fluid into the absorbent layer may also be assisted by treating the next-to-the-skin sheet material so that it is hydrophillic in the area of the aperture or super absorbent lean area in the underlying
20 sheet or absorbent layer. Alternatively, the back flow of urine or other fluid from the absorbent layer can be reduced by forming the next-to-the-skin sheet as an hydrophobic material as a whole or in the area through which the maximum flow of fluid is expected during use.

25

The use of two sheets of material to provide the next-to-the-skin layer of the composite fabric from which the diaper is made also enables the exposed or outer sheet to be modified to achieve other enhancements to the properties of
30 the diaper which would not be feasible where a single sheet were used. For example, slits can be cut in the exposed sheet and the laterally outward edges of the slit elasticated to cause the lip to adopt an upstanding position with respect to the plane of the sheet in which the slit is
35 cut. This forms upstanding leg cuffs without the need to

apply extra strips of material as hitherto required with conventional diaper construction.

As indicated above, it is preferred that the various layers
5 of the diaper composite fabric be bonded together to form a unitary construction, for example by the application of heat and/or pressure or the use of adhesive coatings, notably UV cured adhesives. The bonding together of the various layers assists retention of the particles of super absorber in the
10 desired locations and the formation of the upstanding cuffs when the axial tension is released from the diaper.

Other forms of sanitary articles, for example incontinence pads and sanitary pads which are worn upon the person or
15 wound dressings or adhesive plasters which are applied to the person, also use an absorbent pad within a composite fabric to absorb body fluids excreted or discharged by a wearer. The invention can be applied to such sanitary articles in a similar manner to that described above and the
20 term sanitary article will be used herein to denote in general all forms of article incorporating an absorbent pad used to receive and absorb bodily fluids from a wearer.

DESCRIPTION OF THE DRAWINGS:

25

To aid understanding of the invention, a preferred form thereof will now be described by way of illustration with respect to the accompanying drawings, in which Figure 1 is a plan view from the next-to-the-skin side of the diaper;
30 and Figure 2 is a transverse cross-section through the diaper of Figure 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT:

35 The diaper comprises an outer fluid impervious sheet layer

1, for example an imperforate or microporous sheet of polyethylene or other water impervious plastic. To this is bonded a pad 2 of cellulosic fibres, for example the loose bed of wood fibres obtained by passing a sheet of pulp board through a hammer mill or the like. The pad can be contained within a tissue paper or similar envelope (not shown) and is preferably bonded to the outer layer 1 by axially extending beads 3 of a hot melt adhesive or a coating of a pressure sensitive adhesive applied over the interface area between sheet 1 and pad 2. Within pad 2 is formed a layer of polyacrylate super absorber granules 4 to enhance the fluid absorption properties of the pad 2. This layer is intermittent so as to provide localised absences of the super absorbent in register with the apertures in the next-to-the-skin sheets as described below. However, where the absorbent layer is thick enough to ensure adequate dispersion of fluid away from the apertures, and/or the level of super absorber in the absorbent layer is low, such interruptions in the super absorber layer may not be required.

Over pad 2 is bonded a non-woven sheet 5, preferably of a polypropylene polymer or a cellulosic bonded fibre sheet, which is pervious to bodily fluids. This sheet can be a conventional hydrophobic material or can have the axially central area treated with a surfactant to aid passage of urine and other fluids through the sheet. This sheet can extend laterally for the full width of the diaper as shown dotted, but preferably extends only for part of the width so that it extends beyond the axial slits to be formed in the next-to-the-skin sheet of the composite fabric. Bonded to the underside of the sheet 5 are a series of axial parallel elastic threads which are fed to the interface between pad 2 and sheet 5 under tension during construction of the diaper. Preferably, the threads are coated with a contact

or hot melt adhesive so that passage of the diaper during its construction through the nip of a pressure and/or heated roller, preferably having a diamond or other rib pattern on its surface, will cause the component layers of the diaper
5 to bond to one another with the threads retained in position under tension.

Where the absorbent layer does not contain sufficient super absorber or in replacement of the super absorber in that
10 layer, particles of the super absorber can be carried on the lower face of sheet 5 to form a layer 6 on the under side of sheet 5. Localised areas of low or non-existent application of the super absorber can be achieved by modifying the application of the particles of the super absorber to sheet
15 5 or by cutting apertures 30 in the sheet which are to register with the urethral areas of the body of the intended wearer. These are located differently for males and females so that gender specific diapers can be made by altering the position of the apertures 30.

20 In the embodiment shown in Figure 2, a second sheet 7 of water pervious material carrying a series of tensioned axial elastic threads 8 is applied over sheet 5 and bonded thereto. This sheet extends the full width of the diaper to
25 provide the next-to-the-skin sheet of the diaper composite fabric construction. In order to permit the material forming the axial leg cuffs to upstand, where these are to be present, the adhesive or other bonding agent is omitted over the axial length of the proposed position of the slits.

30 Two axial slits 10 are formed in sheet 7 extending parallel to one another but spaced apart and extending axially over the area of the diaper to be in contact with the crotch area of the wearer. These slits are in register with two of the
35 elasticating threads 11 carried by the sheet 7 and are

preferably preformed in the web of material fed to the diaper construction line. If desired, transverse end 12 cuts can be formed at each end of the slits 10 to aid formation of a flap in sheet 7 which can be folded around 5 the thread 11 with which the slit 10 registers axially. The threads 11 are retained in their tensioned state by the remainder of the bonding of the threads to sheet 7 over areas beyond the slits and at least partially within the length of the slits 10, eg. over from 40% to 60% of that 10 length as shown by areas A and B. The resultant flap of material formed in sheet 7 is folded over to form the sleeve 13 within which the threads 11 are located. The tension in the threads causes the sleeve to contract axially as shown by the diagrammatic shirring effect 14 in Figure 1, although 15 it will be appreciated that this occurs when the axial tension in the diaper is released when the individual diapers are cut from the length of composite fabric and the diaper curls due to the tension in threads 6 and 11, not when the diaper is held in the axially extended flat 20 configuration shown in Figure 1. As a result, the flap and sleeve form an upstanding cuff along the crotch area of the diaper when this is worn by a user. As shown in Figure 1, these cuffs can extend axially only over the crotch region of the diaper, that is over the length of the diaper over 25 which they will need to be effective. This shorter length than conventional cuff designs also reduces the risk that the cuff will flop over when the diaper is applied to the wearer, which has hitherto represented a risk of negating the dam effect of the cuff.

30

The diaper can otherwise be of conventional design and construction with the layers of the diaper fabric bonded together, notably over the waistband areas C and D at each end of the diaper, and with the crotch areas E and F cut 35 away to form an anatomically shaped diaper. Preferably,

further elastication is provided at the edges of the diapers in the cut away crotch areas, for example by including further axial elastic threads 20 in these regions to aid formation of secondary cuffs along the edges of the diaper.

CLAIMS:

1. A disposable sanitary article having an absorbent layer provided with one or more additive materials adapted to enhance the fluid absorption properties of the layer, characterised in that the amount of such additive(s) in a first portion of the pad which is adapted to be in the immediate neighbourhood of the source of the fluid to be absorbed by the pad during use is reduced as compared to the portions of the pad in outward flow relation to that said first portion.
2. A sanitary article as claimed in claim 1, characterised in that areas of the next-to-the-skin layer of the article are rendered hydrophillic.
3. A sanitary article as claimed in either of claims 1 or 2, characterised in that part or all of the absorbent additive material has been removed from that area which is adapted to be in the immediate neighbourhood of the source of fluid applied to the article.
4. A sanitary article as claimed in any one of the preceding claims, characterised in that the article is a disposable diaper made from a composite fabric comprising a fluid impervious sheet or layer, an intermediate fluid absorbent layer and an inner next-to-the-skin sheet or layer; and in that a further sheet or layer is provided intermediate the next-to-the skin sheet or layer and the absorbent layer, which further sheet or layer carries at least part of the said additive material and is provided with one or more apertures therethrough which are adapted to register with the immediate neighbourhood of the source of fluid when the diaper is worn by a user.

5. A sanitary article as claimed in any one of the preceding claims, characterised in that a least part of the article is made from a material which dissolves and/or disintegrates when exposed to a pH value above 7.5.

5

6. A sanitary article as claimed in any one of the preceding claims, characterised in that the next-to-the-skin sheet or layer of the composite fabric from which the article is made has two or more parallel slits formed
10 therein and the laterally outward lips of the slits are provided with means for causing the said lips to adopt an upstanding configuration.

7. A sanitary article as claimed in claim 1, substantially
15 as hereinbefore described with respect to and as shown in the accompanying drawings.

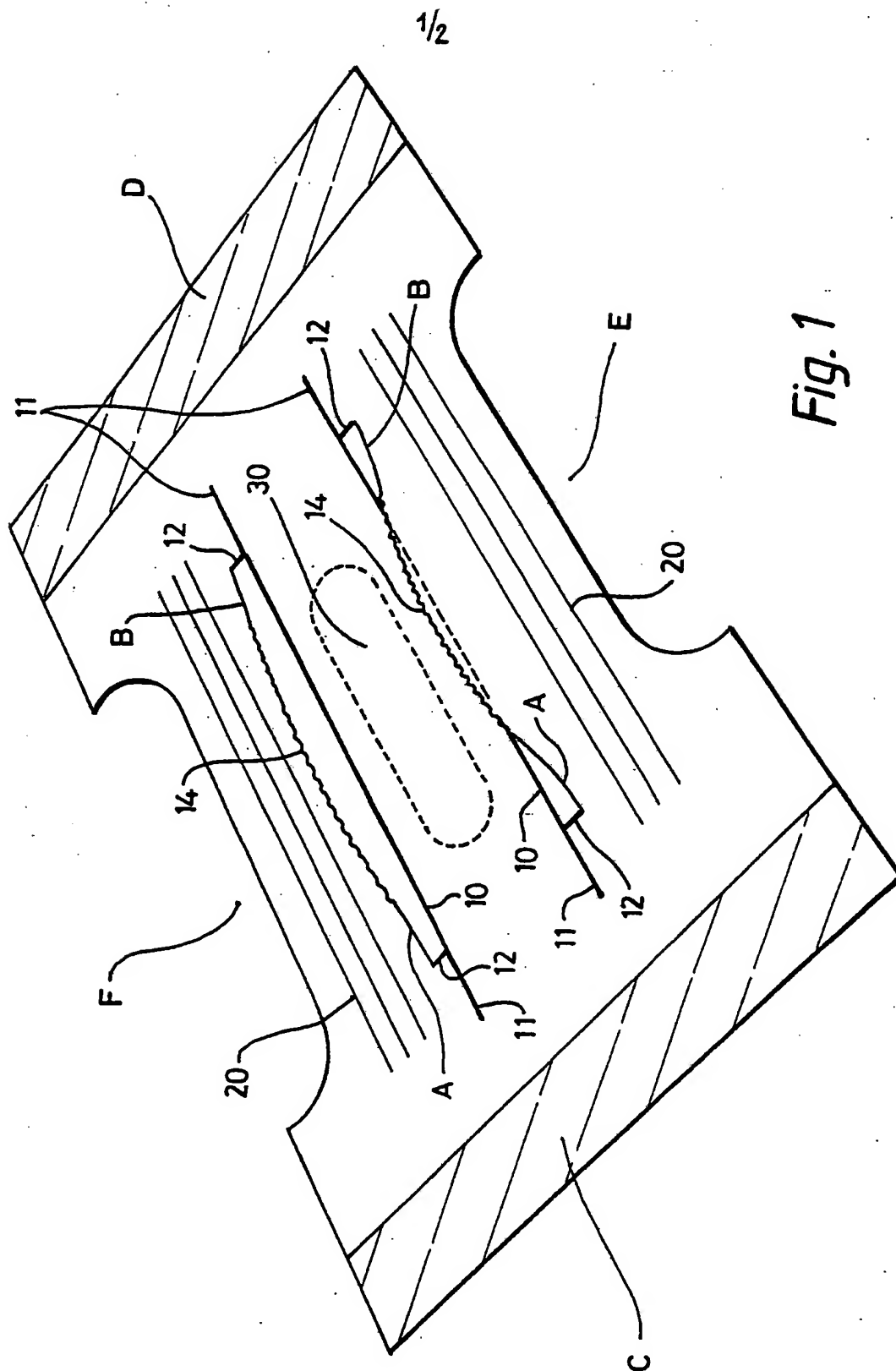


Fig. 1

2/2

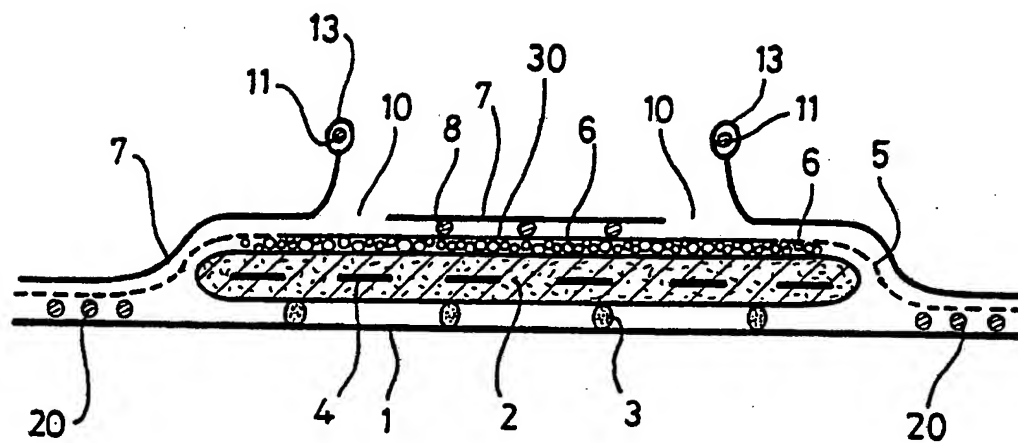


Fig. 2

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 92/01585

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 A61F13/46																				
II. FIELDS SEARCHED <div style="text-align: center; margin-top: 10px;">Minimum Documentation Searched⁷</div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 30%; padding: 5px;">Classification System</td> <td style="padding: 5px;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">Int.Cl. 5</td> <td style="padding: 5px;">A61F</td> </tr> </table> <div style="text-align: center; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched⁸</div>			Classification System	Classification Symbols	Int.Cl. 5	A61F														
Classification System	Classification Symbols																			
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III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <thead> <tr> <th style="width: 10%; padding: 5px;">Category ^a</th> <th style="width: 70%; padding: 5px;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; padding: 5px;">Relevant to Claim No.¹³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">EP,A,0 388 372 (FARICERCA) 19 September 1990</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1,3-4,7</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">see column 6, line 4 - line 13 see column 6, line 47 - column 7, line 1 see column 8, line 22 - line 30 see figures 4,7-8</td> <td style="text-align: center; vertical-align: top; padding: 5px;">5</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">EP,A,0 325 416 (PROCTER & GAMBLE) 26 July 1989 see page 4, line 17 - line 26 see page 4, line 35 - line 38 see page 11, line 35 - line 38 see page 11, line 64 - page 12, line 2 see figures 2-4</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1-3,7</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">Y</td> <td style="padding: 5px;">US,A,4 062 451 (R.J.GANDER) 13 December 1977 cited in the application see abstract</td> <td style="text-align: center; vertical-align: top; padding: 5px;">5</td> </tr> <tr> <td colspan="3" style="text-align: center; padding: 5px;">-/-</td> </tr> </tbody> </table>			Category ^a	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	EP,A,0 388 372 (FARICERCA) 19 September 1990	1,3-4,7	Y	see column 6, line 4 - line 13 see column 6, line 47 - column 7, line 1 see column 8, line 22 - line 30 see figures 4,7-8	5	X	EP,A,0 325 416 (PROCTER & GAMBLE) 26 July 1989 see page 4, line 17 - line 26 see page 4, line 35 - line 38 see page 11, line 35 - line 38 see page 11, line 64 - page 12, line 2 see figures 2-4	1-3,7	Y	US,A,4 062 451 (R.J.GANDER) 13 December 1977 cited in the application see abstract	5	-/-		
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Y	US,A,4 062 451 (R.J.GANDER) 13 December 1977 cited in the application see abstract	5																		
-/-																				
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>^a Special categories of cited documents : ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>																				
IV. CERTIFICATION <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 5px;"> <tr> <td style="width: 50%; padding: 5px;"> Date of the Actual Completion of the International Search <div style="text-align: center; margin-top: 10px;">11 DECEMBER 1992</div> </td> <td style="width: 50%; padding: 5px;"> Date of Mailing of this International Search Report <div style="text-align: center; margin-top: 10px;">05.01.93</div> </td> </tr> <tr> <td style="width: 50%; padding: 5px;"> International Searching Authority <div style="text-align: center; margin-top: 10px;">EUROPEAN PATENT OFFICE</div> </td> <td style="width: 50%; padding: 5px;"> Signature of Authorized Officer <div style="text-align: center; margin-top: 10px;">NICE P.</div> </td> </tr> </table>			Date of the Actual Completion of the International Search <div style="text-align: center; margin-top: 10px;">11 DECEMBER 1992</div>	Date of Mailing of this International Search Report <div style="text-align: center; margin-top: 10px;">05.01.93</div>	International Searching Authority <div style="text-align: center; margin-top: 10px;">EUROPEAN PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center; margin-top: 10px;">NICE P.</div>														
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
A	EP,A,0 343 941 (PROCTER & GAMBLE) 29 November 1989 see column 24, line 30 - line 58 see figures 5,7-8 ---	1-4
A	GB,A,2 174 037 (PERSONAL PRODUCTS) 29 October 1986 see page 4, line 59 - line 63 see page 7, line 26 - line 27 see figures 1-4,9 -----	1-4

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9201585
SA 63874

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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